

NON-PUBLIC?: N  
ACCESSION #: 9304160154  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: THREE MILE ISLAND, UNIT 1 PAGE: 1 OF 4

DOCKET NUMBER: 05000289

TITLE: REACTOR COOLANT PUMP POWER MONITOR MALFUNCTION  
RESULTING  
IN REACTOR TRIP  
EVENT DATE: 03/12/93 LER #: 93-003-00 REPORT DATE: 04/12/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: Y POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: A. W. MILLER, TMI-1 LICENSING TELEPHONE: (717) 948-8128  
ENGINEERING

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: JC COMPONENT: MON MANUFACTURER: R335  
X JC R335  
X JC TMR C612

REPORTABLE NPRDS: Y  
Y  
Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On March 12, 1993, TMI-1 was operating at 100% power. During performance of surveillance testing for the Heat Sink Protection System (HSPS) an equipment malfunction in the Reactor Coolant Pump Power Monitor (RCPPM) 1 resulted in sending an erroneous Reactor Coolant Pump Trip signal to the Reactor Protection System (RPS). The RPS functioned normally and tripped the reactor due to a mismatch between Reactor Power and the number of running Reactor Coolant Pumps.

The root cause was electrical equipment failure in the Reactor Coolant Pump Power Monitor 1. The failed equipment was repaired and satisfactorily tested. The remaining RCPPM's shall be inspected and repaired as necessary to improve reliability during testing. Also, procedure enhancements to the surveillance procedure will be made to provide additional checks on equipment status before and after each switching sequence.

END OF ABSTRACT

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## REACTOR COOLANT PUMP POWER MONITOR MALFUNCTION RESULTING IN REACTOR TRIP

### I. PLANT OPERATING CONDITIONS BEFORE THE EVENT

The plant was operating at 100% power prior to the event. Reactor Protection System (RPS) \*JC/--! Channel A was in manual bypass as part of the test procedure for the Heat Sink Protection System \*JB/--!. The Reactor Coolant Pump Power Monitor (RCPPM) JC/MON! Number 1 had been bypassed for the test and was being restored to the operate mode.

### II. STATUS OF STRUCTURES, COMPONENTS, OR SYSTEMS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT

There were no structures, components, or systems inoperable at the start of the event that contributed to the event.

### III. EVENT DESCRIPTION

Surveillance Procedure 1303-11.39A (Heat Sink Protection System (HSPS) Emergency Feedwater (EFW) \*BA/--! Auto Initiation), was being performed. The logic test for actuation of A train EFW on loss of all four Reactor Coolant Pumps \*AB/P! had been completed successfully and the Reactor Coolant Pump Power Monitor (RCPPM) was being returned to normal.

When the BYPASS/NORMAL switch (SS-1) \*JC/33! on the RC-P-1D pump monitor was returned to NORMAL, the reactor tripped. As the SS-1 switch changes position, the output relays for the affected pump monitor momentarily de-energize. With the relays de-energized, the output signal to the RPS and HSPS indicates that the affected pump has tripped. The momentary signal that RC-P-1D had tripped, along

with an erroneous indication that RC-P-1C was also tripped, caused the RPS to trip the reactor. The trip response was normal. The Reactor Coolant Pumps continued to run throughout the event.

At the time of the trip, it was noted that the indicating lamps for the output relays on the RC-P-1C pump monitor were off when they should have been on. The Operator stated that the lights initially came on when the RC-P-1C monitor was returned to NORMAL, and subsequently went out.

The output relays for the RC-P-1C pump remained in the tripped state for approximately one hour after the trip, then returned to their expected energized state without intervention.

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When the test sequence for the C RCPPM was repeated, the monitor functioned correctly. The malfunction could not be reproduced. The components that could have caused the failure were identified. The Bistable and SS7 switch were replaced with spares. A replacement time delay relay was procured and installed. Higher than expected contact resistance was measured on the SSI switch, so the switch contacts were cleaned.

The SS1 switch contacts were cleaned on the remaining three monitors on Cabinet 1, and on the four monitors on Cabinet 2. The replacement bistable and time delay relay were calibrated, and the Surveillance Test 1303-11.39A was repeated successfully.

The reactor trip was reported in accordance with 10 CFR 50.72 b. 2. ii. This LER is provided under 10 CFR 50.73 a. 2. iv.

#### IV. COMPONENT FAILURE DATA

RCPPM - Rochester Instrument Co  
Bistable - Rochester Instruments XET-214T2  
Time Delay Relay - Agastat 2B45K81C.

#### V. AUTOMATIC OR MANUALLY INITIATED SAFETY SYSTEM RESPONSES

The Reactor Protection System functioned correctly to trip the reactor when the momentary signal was received indicating that two Reactor Coolant Pumps were off. The Control Rod Drive trip breakers and control rods functioned normally to shut down the reactor.

#### VI. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF

## THE EVENT

The post trip response was normal and the operator response was appropriate. There were no safety consequences from the trip.

## VII. PREVIOUS EVENTS OF A SIMILAR NATURE

There have been no previous events of a similar nature where malfunction of the RCPPM caused a reactor trip.

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## VIII. CORRECTIVE ACTIONS PLANNED

A root cause evaluation has been performed to identify the cause. The most probable causes are either cold solder joint(s) at the time delay relay connections to wires from the bistable trip contact or high contact resistance in the bistable output relay contact.

The corrective actions planned are listed below:

1. Confirm the remaining time delay relay solder joints are acceptable and repair if necessary, or replace the time delay relays in Train A RCPPM A, B, & D and Train B RCPPM A, B, C, & D with the same time delay relay used in Train A RCPPM C.

2. Bistables in the remaining RCPPM's will be inspected and their output contacts burnished, if necessary. Based on the results of this check, it will be determined if future checks are required.

3. Surveillance Procedure 1303-11.39A is being revised to:

- Provide a Caution statement that manipulation of the SS-1 switch results in a momentary RC Pump trip signal to all RPS channels.

- Add the requirement to check all the RCPPM output relay status lamps before and after each switching sequence.

\* The Energy Industry Identification System (EIIS), System Identification (SI), and Component Function Identification (CFI) Codes are included in brackets, "SI/CFI!," where applicable, as required by 10 CFR 50.73(b)(2)(ii)(F).

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April 12, 1993  
C311-93-2049

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

Dear Sir:

Subject: Three Mile Island Nuclear Station, Unit 1 (TMI-1)  
Operating License No. DPR-50  
Docket No. 50-289  
LER 93-003-00

This letter transmits Licensee Event Report (LER) 93-003-00 concerning a Reactor Coolant Pump Power Monitor malfunction resulting in a reactor trip. Public health and safety were not affected.

This LER is submitted pursuant to 10 CFR 50.73. Attached is an abstract which provides a brief description of the event. For a complete understanding of the event, refer to the full text of the report.

Sincerely,

T. G. Broughton  
Vice President and Director, TMI-1

AWM/mkk

Attachment

cc: Region I Administrator  
TMI-1 Senior Project Manager  
TMI Senior Resident Inspector

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